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U. S. DEPARTMENT OF AGRICULTURE.

FARMERS' BULLETIN No. 143.

CONFORMATION OF BEEF AND DAIRY CATTLE.

BY

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WASHINGTON:

GOVERNMENT PRINTING OFFICE.

1902.

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY,
Washington, D. C., October 22, 1901.

SIR: I have the honor to transmit for publication a manuscript on "The conformation of beef and dairy cattle," prepared by Prof. Andrew M. Soule, vice-director of the Tennessee Agricultural Experiment Station.

The selection of animals best suited for their intended use is of great importance to feeders and dairymen; and it is even more important to breeders of animals of either class. That the character of the animal is indicated by its visible and tangible qualities is a general rule which has comparatively few exceptions. The importance, therefore, of being able to judge cattle by sight and touch is apparent. The author has endeavored by diagrams, descriptions, and suitable illustrations to embody in this paper the information necessary to enable the stock feeder, the breeder, the farmer, or the dairyman to become a competent judge.

I respectfully recommend its publication as one of the series of Farmers' Bulletins.

Respectfully,

D. E. SALMON,
Chief of Bureau.

Hon. JAMES WILSON, *Secretary.*

CONTENTS.

	Page.
Introduction	7
Conformation	8
Explanation of the term "conformation"	8
Importance of studying conformation	9
Stock judging	10
Learning the points	12
The score card	14
Viewing the animal	15
Studying relative proportion	15
Comparative judging	16
A study of the details of conformation	18
The head	18
The neck	21
Girths	23
The back	24
Side lines	26
Shapes: Wedges and parallelograms	27
The ribs	29
The barrel	30
The hind quarters	30
The milk veins	32
The udder	33
The escutcheon	35
Some typical animals—good, bad, and indifferent	36
The ideal dairy cow	36
The dual purpose cow	36
Defective dairy cows	37
The scrub cow	39
The polled type of beef cattle	39
The range steer	40
A poor feeder	41
Grading up common stock by crossing	42
A good dairy sire	42
Some good dairy heifers	42
A good beef sire	43
Young beef animals	44

ILLUSTRATIONS.

	Page.
FIG. 1. Chicago retail dealers' method of cutting beef	11
2. Points and measurements to be observed in judging beef cattle	12
3. Points and measurements to be observed in judging dairy cattle	13
4. Typical heads of beef cattle	18
5. Typical heads of dairy cattle	19
6. Relative development of frontal bone in dairy and beef cattle	20
7. Heads of native steers defective in quality	20
8. Frontal contours of heads	20
9. Necks of beef cattle	21
10. Necks of dairy cattle	21
11. The beef cow's neck as seen from in front and below	22
12. The dairy cow's neck as seen from above and in front	22
13. Side view of dairy cow's neck, deficient in development	23
14. Girths of dairy and beef cows	23
15. Back lines of dairy and beef animals	24
16. Beef cow showing proper development of back and side lines	25
17. Back of a dairy animal as it should be	25
18. A contracted back associated with flat ribs	26
19. Side lines of beef and dairy cows	26
20. Contrasts in "wedges"	27
21. Outlines of shape of beef cow as compared with parallelograms	28
22. Outlines of shape of dairy cow as compared with parallelograms	28
23. The spring of the ribs in dairy and beef cows	29
24. Development of barrel in beef and dairy cows	30
25. Dairy cow with proper development of posterior regions	30
26. Dairy cow deficient in quality and symmetry	31
27. A young beef animal showing good development of posterior regions	31
28. A native steer	32
29. Types of milk veins	32
30. Types of udders	33
31. The escutcheon or "milk mirror"	35
32. A typical dairy cow	36
33. A dual purpose cow	37
34. A dairy cow too long in the coupling	38
35. A fairly good dairy animal, but lacking in depth and stamina	38
36. A scrub cow	39
37. A first-class beef steer	40
38. A uniformly developed feeder	40
39. An unprofitable feeder	41
40. A poorly developed feeder	41
41. A typical dairy sire	42
42. Dairy heifers, from native cows crossed with a dairy sire	43
43. A typical beef sire	43
44. Young beef animals from native cows crossed with a pure-bred beef sire	44

CONFORMATION OF BEEF AND DAIRY CATTLE.

INTRODUCTION.

The object of this bulletin is to present in a simple and graphic way some information concerning the differences between good and inferior animals and the extent to which certain desirable qualities affect their value for beef and dairy utility. On a great many farms the owners imagine they have choice specimens of stock when they are working with a hopelessly indifferent class; and, failing to accomplish the ends sought, they declare the business unprofitable and unworthy of their further consideration. Hence an endeavor will be made to define as nearly as possible the ideals that should be kept in view in pursuing this business and to point out as far as possible the relation of these standards to the economic side of animal industries. As a matter of fact, without ideals stock raising can not be made a success, and this is one reason why it has not often been more successfully pursued in the South.

While in a paper of this kind there will doubtless be some personal theory, and while every idea presented will not coincide with the practice and theory of every other man, as a rule the basis taken has been carefully chosen and the endeavor has been to present only those ideas that have a specific value to the stockman and are sufficiently well established to furnish reliable data for his guidance. Facts and figures could be abundantly supplied to substantiate the statements incorporated in this text were it necessary. At the Tennessee Experiment Station certain animals fed for beef gained $2\frac{1}{2}$ pounds per day, while others under the same conditions gained only $1\frac{1}{2}$ pounds. Some animals consumed almost twice as much food as others for a given gain. The best animals only dressed 59 per cent of valuable meat and the average only $55\frac{1}{2}$ per cent. Moderately good animals crossed with an improved strain of stock should dress at least 60 per cent. Figuring a loss of 5 per cent on the slaughter test, with the number of beef cattle in the State of Tennessee the enormous total of 20,078,870 pounds of loss in slaughtering is indicated, representing a money value to the farmer of \$603,166.10. The influence of blood, breeding, conformation, etc., are well illustrated by the fact that certain steers fed in an experiment at the same station gained only 45 to 48 pounds in sixty days, while others under practically the same conditions gained from 125 to 150 pounds in the same length of time. Illustrations of a similar nature might be drawn from experience in

feeding hogs and in producing a pound of milk or butter from dairy cows of several types. All writers who have given this matter any thoughtful consideration point out facts similar to these, demonstrating the great losses incurred through ignorance of the fundamental principles of conformation.

Reasons for Considering Beef and Dairy Cattle Together.—In a single paper it is impossible to cover the whole field of stock judging, and the writer's idea has been to confine this paper to a consideration of beef and dairy cattle, as these are two of the leading interests of American farmers. It has been thought best to consider these together, because stronger contrasts can be drawn and differences can be shown more clearly. It is a well-known fact that two opposite tendencies can not be highly developed and maintained in the same organization at the same time. Every breeder and feeder of a special class of stock realizes this and regards it as a clearly defined and long-established axiom. It is simply flying in the face of nature to attempt to secure perfect development in the milk and beef functions at the same time. The figures showing the points and discussing their relative development and what constitutes perfection have been considered in some detail. The other illustrations are more briefly discussed throughout the paper, because the endeavor has been to make them clearly express their meaning to the eye.

CONFORMATION.

EXPLANATION OF THE TERM "CONFORMATION."

The term conformation, as used in this bulletin, has a much wider significance than is implied in the literal meaning of the word. It treats of the exterior form of an animal as related to function, locomotion, and adaptability for a specific purpose. It includes the prominent and obvious points as well as the inner structure. It reveals the characteristics accompanying strength of constitution, stamina, and mental vigor, or the reverse, as if all the interior structure were available for ocular examination. And, finally, its study familiarizes the thoughtful observer with individual peculiarities of form, etc., as related to utility and production.

Conformation an Index of Utility.—While conformation does not absolutely measure utility, it strongly indicates the merits and defects of animals, and can be relied on to a remarkable degree. For example, it has been demonstrated that a race horse having short cannon bones and length in the bones above the knee has the most desirable conformation for speed. It is also a well-known fact that where the bones of the leg have wide angles and strong prominences on their surface, so that the muscles can play over them and secure greater tension and elasticity, a longer and more uniform stride is obtained; that there is less jar and concussion on the limb, and as a result the animal has greater stamina and endurance and wears better on the road or on the race track, as the case may be.

From a critical examination of the exterior points of an animal a fairly correct estimate can always be made of the quality of the interior or hidden points. The depth from the withers downward and the length and width of the chest proclaim well developed vital organs as surely as if they were exposed for ocular examination. A large, spreading, and tortuous milk vein, coming well forward on the belly and entering through a large orifice into the abdominal region of the cow indicates that a large quantity of venous blood is transferred through it from the udder back to the heart. Milk being an indirect product of the blood, it is evident that this point has a specific value in the make-up of an animal for dairy purposes. Thus each visible part or feature of the animal has meaning.

IMPORTANCE OF STUDYING CONFORMATION.

It is necessary that the successful feeder and breeder be a careful student of conformation. He should acquire a true appreciation of the value of details in conformation, and he should become so intensely interested in the subject and study it so thoroughly as to become an expert in reading the language of points often regarded as unimportant. The study of the points of the animal and their relation to one another gives the student an idea of the importance of correlation, symmetry, animal mechanism, and quality, a knowledge of whose fundamental principles is an invaluable aid to the feeder and breeder. The man who realizes that all the organs of the body are harmonized and proportioned according to certain laws sees at once that animal mechanism and symmetry are qualities to be given the most careful consideration. He also realizes that a defect in one organ will influence all the others in that animal in proportion to its importance. He appreciates that only where perfect harmony prevails and where every organ performs its functions with the least friction can the greatest endurance and stamina be found. Conformation enables the discernment of hidden diseases, such as tuberculosis or others of a scrofulous nature. These are questions of more than passing importance, for it often happens that ignorance of a conformation indicating tuberculosis results in the purchase and introduction of animals into herds and flocks with disastrous results. It is surprising how few know that the ox has four stomachs, and fewer still understand the functions of each. Yet it has been demonstrated that this animal does its best work when each of these organs is supplied with the particular kind and amount of food nature has adapted it for. Not one feeder in a hundred could give a sufficient reason why he pursues a certain practice in feeding or why such desirable results should follow his method. Yet it is evident to the most superficial mind that an intimate knowledge of anatomy and physiology would make many of these things clear and certainly place the feeder in a position to profit by his successes and to better understand his failures.

Benefit of Studying Conformation.—The study of conformation trains

the mind and the eye to clearly discern and estimate the detracting influence of a present defect, and certainly this training is of the utmost value to every individual interested in handling stock. Those who possess it will seldom be swindled in the purchase of animals nor defrauded in selling, because they will know for themselves the real merit of the animal under consideration. It broadens and cultivates ideals which are absolutely necessary to the successful breeder and feeder. It establishes a standard of excellence whose guidance must be sought at all times by the breeder of live stock. Unless one can judge to a considerable degree the individual merit of unknown animals he is hopelessly lost if he attempts to follow stock husbandry. Outward signs, when their true importance is understood, enable him to estimate the individual performance of the animal for a specific purpose. To the man who makes his living by handling stock, a knowledge of live weight is of great importance; and yet it is strange that so many practical farmers have but an indifferent conception of the weight of animals as they stand in the stall or field, and consequently are often fleeced by experienced and unscrupulous dealers.

A word of explanation concerning the relation of the terms "conformation" and "function" may be useful here. Some overzealous partisans have claimed that conformation absolutely measures utility. The experience of practical stockmen does not bear out the claim, and hence some farmers have concluded that a study of conformation is unimportant. They fail to appreciate the fact, however, that conformation is largely the result of function rather than that function is the result of conformation. No reasonable person can deny that function has determined the distinctive form of the dairy cow as compared with that of the beef animal. Nevertheless, after the form has become fixed as the result of the continued development of certain functions, it is not at all remarkable that conformation should be occasionally transmitted without function and vice versa. This does not in the least militate against the importance of conformation, but it does explain many of the seemingly unaccountable exceptions met with in actual practice, which, from a failure to survey the whole field, have led some farmers to false conclusions.

STOCK JUDGING.

Unless one has a knowledge of conformation and is able to perceive defects in the living animal or which will be exposed by the slaughter test, he is not likely to succeed as a breeder or feeder. Not long ago a gentleman visiting the university farm, and being present when the steers were fed, picked out what he regarded as the three best animals in the bunch. As a matter of fact these were the three most inferior animals and had made the poorest gains of any. This gentleman was then feeding 100 cattle of his own. It certainly would not be surprising if a man with so little knowledge of animal value as indicated by exterior development should make a failure of cattle feeding.

Figure 1 shows how a beef animal is cut up in the Chicago market and the value of the different parts of the carcass. In some sections a considerable proportion of beef animals have been crossed with Jerseys. The Jersey, being a dairy animal, is cat-hammed and light in the flank. As the most valuable portions of meat come from the hind quarter, it is of the utmost importance to the beef feeder that he secure animals which are long, square, and blocky in the hind quarter, wide across the rump, and well fleshed at the flank and twist. Many feeders put in their stalls cattle with tremendous development in the fore quarter, where the bone and offal predominate, and furnish the butcher animals small and undeveloped in the region of the loin and hind quarter whence the most valuable and useful cuts are obtained. A knowledge of stock judging would soon eradicate such methods and result in a vast improvement in live stock and a large financial gain to those engaged in feeding cattle. The constant handling of stock familiarizes the feeder with the qualities sought in an animal of exceptional merit.

He becomes so expert that in running his hand over the animal he can tell from the condition of hide and hair and the elasticity of the former whether or not the animal will be a good feeder. He can discern from the general contour lines about

how the animal will finish, and what per cent of valuable meat it should yield. He knows when an animal is well covered with flesh on the desirable parts of the carcass, and he understands the characteristics sought in an animal of exceptional quality.

Learning to be a competent judge of stock is not as difficult as one might anticipate. Many schools and colleges offer courses where the student is trained after the most careful and approved methods. The work required is largely practical, and consists of actual experience in the art of judging. While it is more difficult for the layman to become a competent judge without specific training, certain rules can be laid down for guidance which will simplify matters and enable him to acquire a good deal of useful training without wasting a lot of time and physical energy.

Of course it is more difficult for the amateur to acquire the knowledge by himself than when assisted by competent instructors; still it is astonishing how quickly a correct estimate of the value of animals for a definite purpose can be gained.

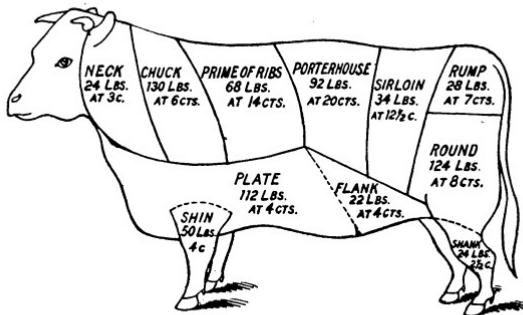


FIG. 1.—Chicago retail dealers' method of cutting up beef.

LEARNING THE POINTS.

In figures 2 and 3, anterior, posterior, and lateral views of beef and dairy types are presented, indicating all the points and measurements that should be considered in judging, a list of which appears below.

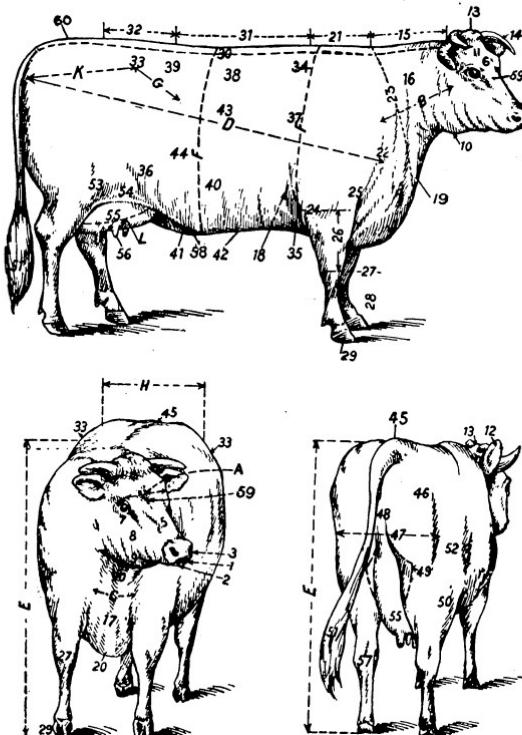


FIG. 2.—Points and measurements to be observed in judging beef cattle.

NAMES OF POINTS.

- | | | |
|----------------------------------|--|--|
| 1. Mouth. | 15. Neck. | 28. Arm—portion of leg between shoulder and knee. |
| 2. Lips. | 16. Neck—lateral view. | 27. Knee. |
| 3. Nostrils—airpassages. | 17. Breast or bosom—front of chest. | 28. Cannon or shank—bone between knee and ankle in fore or hind leg. |
| 4. Muzzle—bare. | 18. Fore flank—rear of arm. | 29. Hoof. |
| 5. Face—from muzzle to poll. | 19. Dewlap—loose skin underneath the throat. | 30. Spinal column—backbone. |
| 6. Forehead—from eyes to poll. | 20. Brisket—point of chest. | 31. Barrel or coupling—middle piece. |
| 7. Eye. | 21. Withers—top of shoulders. | 32. Loin—muscle covering the short ribs. |
| 8. Cheek—side of head below eye. | 22. Shoulder point. | 33. Hooks or hips. |
| 9. Jaw. | 23. Neck or collar—depression in front. | 34. Crops—depression behind shoulder. |
| 10. Throat. | 24. Elbow. | |
| 11. Brains. | 25. Chest—cavity inclosing vital organs. | |
| 12. Ear. | | |
| 13. Poll—top of head. | | |
| 14. Horns. | | |

Naturally the first step is to learn the names of the points. Their location, which is practically the same in all classes of stock, can be quickly learned by coming in contact with living specimens and

going over the points in a systematic manner. Next, their significance should be ascertained. The first animals selected should be as nearly perfect as possible, so that correct ideals may be established in

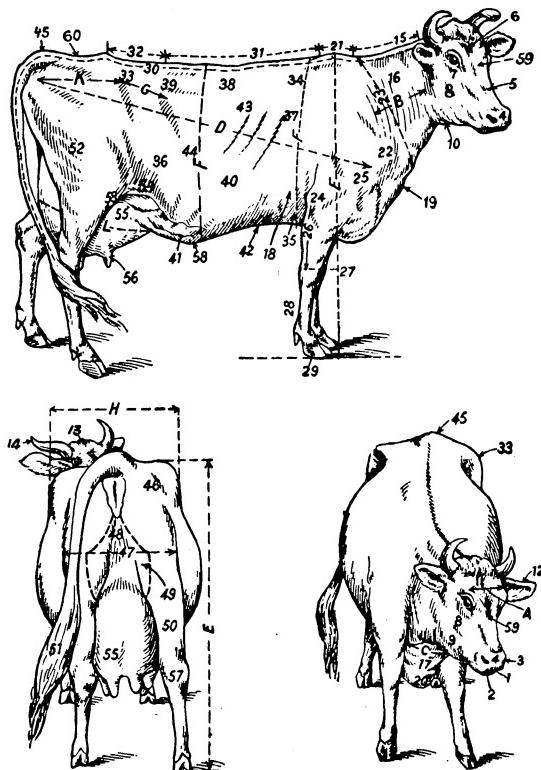


FIG. 3.—Points and measurements to be observed in judging dairy cattle.

NAMES OF POINTS—continued.

- | | | |
|--|---|---|
| 35. Girth at heart. | 43. Mid ribs. | 51. Brush. |
| 36. Girth at flank. | 44. Abdominal depth, indicating digestion and constitution. | 52. Thigh. |
| 37. Fore ribs. | 45. Tail head. | 53. Stifle. |
| 38. Chine—between withers and loin. | 46. Pin bones. | 54. Flank. |
| 39. False or floating ribs. | 47. Buttocks. | 55. Udder. |
| 40. Belly. | 48. Escutcheon—covered with fine hair. | 56. Teats. |
| 41. Milk veins—branched and tortuous ducts running forward beneath the barrel. | 49. Twist—where hair turns on thigh. | 57. Hock. |
| 42. Orifices through which the milk veins enter the abdominal walls. | 50. Gaskin or lower thigh. | 58. Navel or umbilicus. |
| | | 59. Dish. |
| | | 60. Pelvic arch or sacrum—the arch bone between the loin and crupper. |

ANIMAL MEASUREMENTS.

- | | | |
|---|-------------------------------------|---------------------------------|
| A. Width of forehead. | E. Height at withers and hooks. | G. Length of barrel depression. |
| B. Length of neck. | F. Girth at gore, flank, and navel. | H. Width of hooks. |
| C. Width of breast. | | K. Length of hind quarters. |
| D. Length from pin bones to shoulder point. | | L. Circumference of udder. |

the mind. Other animals should then be introduced and the good and bad points of each clearly brought out by contrast. Those who are

pursuing the study in a regular college course will find it very profitable to make sketches of typical animals, locate and number the points, and prepare written statements of what they have learned.

Unfortunately standards of measurements have never been accurately worked out for the several classes of farm animals. Owing to the wide variations in both breeds and individual animals it would be exceedingly difficult, if not impossible, to establish satisfactory standards. It must not, however, be supposed that measurements are of no value. This can not be ignored in actual practice, and especially by the novice, because of the difference in the relative size and development of the several regions in individual animals in the same class.

THE SCORE CARD.

Score cards may be of various kinds, and almost every stock association has one after its own heart, but for general use the accompanying card is recommended. Of course the card is modified to suit the class of animals under discussion, the one shown being used exclusively for dairy cattle.

Scale of points for dairy cows.

I. Primary considerations—16 points.	Perfect score.
Weight, — pounds.	
Size and substance for age	3
Style attractive, sprightly; breeding apparent	4
Appearance wedge-shaped, angular	4
Quality: skin thin, loose, elastic, mellow; flesh firm; hair soft, fine, and silky	5
II. Nervous energy—26 points.	
Temperament active, controlled	5
Eyes large, clear, bright, mild, placid, free from white	6
Forehead broad, high; face dished	3
Ears broad, thin, active	2
Spinal column long, prominent, open	4
Milk veins branching, long, tortuous	4
Navel large, defined	2
III. Structural anatomy—15 points.	
Contour clean-cut, smooth, correlated, symmetrical, free from patchiness and offal	2
Head medium in size; muzzle refined; mouth large; face lean and long	1
Neck fine, medium length, flat on side; throat clean; dewlap light	1
Withers narrow on top, spreading; shoulder light and slanting	1
Back straight, strong, well muscled	2
Loin broad and strong	3
Pelvic arch prominent, bare; pin bones high, wide	2
Flank high; twist open; thigh thin and incurved	1
Bones medium; joints fine, flat; horns small, waxy; tail long, slim	2
IV. Digestion and assimilation—25 points.	
Nostrils medium-sized, clear, and bright	1
Breast and brisket prominent, angular	1
Chest wide, deep, long; girth large	8
Barrel medium long, broad on top, deep, capacious	9
Ribs flat, spaced, well sprung; chine open	3
False ribs suppressed; barrel depression marked	3

Perfect
score.

V. Milk indications—18 points.	
Udder long, capacious, balanced, free from fleshiness, strongly attached, collapsed when empty; teats evenly placed.....	8
Escutcheon spreading over thighs, extending well upward.....	3
Milk veins large, tortuous, long and branched; milk wells large.....	6
Skin of ear and udder yellow; secretions yellow.....	1
VI. Obvious and deductive defects	0
Total.....	100

VIEWING THE ANIMAL.

The next step is to learn the correct view points in stock judging—the positions that should be taken that one may get the clearest conception of contour lines, of relative proportion or symmetry, of correlation, and of comparative development where several animals are in the class. The four principal view points for the observer in judging any class of stock are anterior, in front; posterior, at the rear; superior, standing at the side to look down on the back; inferior, a half-kneeling position at the side to look along the bottom line or belly. The reason for assuming these different positions is apparent. In judging the trueness and strength of the gait of a horse and the development of the chest and muscles of this region, a correct estimate can best be formed by having the horse come down toward one at full speed. The action of the posterior region can best be determined when the horse is going away from one. To study the length of the stride and the relative knee and hock action and the muscular development of the limbs, a side position is best, and a rotation of these positions enables one to detect any irregularity of conformation or physical defect that might otherwise escape the judge's attention. The careful observation of beef and dairy cattle from these viewpoints enables one to quickly estimate the strong and weak points of individual animals and to determine the relative merit exhibited by the several animals.

STUDYING RELATIVE PROPORTION.

In the study of contour lines and relative proportion the tapeline is invaluable. The idea is to train the eye to detect minor differences and to estimate correctly the length of quarter, width of head, girth, etc., of the several animals in a class. If proper animals are studied, these measurements give a fair conception of the proportions that should be found in good specimens of a breed or class, and enables the observer to formulate a standard for his future guidance. As a feature of training for stock judging, this phase of the work can not be emphasized too strongly, and sufficient practice should be prescribed in it whether a system of self-training is pursued or a course as laid down in some institution.

The student of stock judging should now undertake to place in the order of their merit several individuals of a breed or class, giving

his reasons for the judgments he makes. He must learn to make discriminations along general lines and to read the animals' good and bad qualities quickly and in a systematic manner.

It is hardly necessary to state that the use of the individual score card would be absurd in the show ring, but the thorough and exact training secured by the use of the score card enables the student to reach the stage where he can quickly estimate the value of an animal for a specific purpose. After some practice with the score card he should endeavor to make and record his decisions with attached reasons in a limited time, in order that he may acquire celerity in his work, a great desideratum in a competent judge.

COMPARATIVE JUDGING.

Comparative judging is the highest class of work which the judge of stock will be called upon to perform. By way of training for this he should go into a herd or flock and pick out the best individuals regardless of age, type, or breed. Afterwards he should study animals of the same class but of different ages and place them in accord with their respective merits, as must be done—for example, in actual showing competitions, where animals from 6 to 24 months of age may be exhibited against one another.

Comparative judging is the most difficult of all and can only be learned by constant practice, coupled with a knowledge of external indications and what the present development of a point may mean six months or two years hence. Whether an individual will finally become a successful judge of stock will depend on his natural bent, his knowledge of the subject, and the amount of practice he has. A competent all-around judge can only be developed by actual experience, and a good deal of it.

Comparative development sought in the various regions of the beef and dairy types.

	<i>Beef.</i>	<i>Dairy.</i>
General characteristics:	Compact form, wide and deep, medium length in coupling; wide, straight back; good hindquarters; wide, deep, and full fore quarter, and long, wide, and deep hind quarter; well balanced, and having easy carriage.	Length and depth of coupling; clean-cut contour of head, neck, withers, and limbs; well-developed udder and milk vein; width through the heart and loin; capacious chest indicating constitution; wide-spaced and well-sprung ribs; soft, elastic skin; an active carriage.
Size:		Medium to large.
Form:	Parallelogramic.	Angular and wedge-shaped.
Head:	Medium short, clean cut, broad.	Medium, clean cut, longer and lighter, and with more dish than in beef breeds.
Nose:	Fine, straight.	Slightly dished.
Muzzle:		Medium, dewy.
Nostrils:		Large and open.
Eyes:		Prominent, lively, full, and clear.
Poll:		Medium wide.
Horns:		Medium.
Ears:	Medium broad and active.	Medium thin, active, and yellow skinned; secretions oily and abundant.

Comparative development sought in the various regions of the beef and dairy types—Continued.

	<i>Beef.</i>	<i>Dairy.</i>
Neck:	Medium to short, uniting smoothly with head and gradually widening and deepening toward the neck vein so as to blend insensibly into the shoulder.	Long and light, oval and flat on the side, fine at the junction of the head, making an abrupt junction with the neck vein.
Back:	Broad, level, and well fleshed from poll to tail head.	Narrow at withers, broad at the loin, slightly swayed, with well-defined spinal column and well-arched pelvic region.
Fore quarters:	Wide, deep, and full.	Light and spare.
Withers:	Broad and level.	Narrow on top, spreading.
Shoulders:	Well developed, and well covered with flesh.	Light and bare.
Chest:		Capacious.
Breast:	Broad, deep, and well filled.	Wide from side to side.
Brisket:	Broad and well rounded.	Wedge-shaped.
Arm:	Broad, well filled.	Rather light.
Barrel or coupling:	Wide, roomy, medium in length, longest in females.	Long, deep, and capacious.
Ribs:	Well sprung, close, carried well forward.	Broad, spaced, downward and backward sprung.
Crops:	Well filled.	Steep.
Fore flank:	Well filled.	Rather light.
Hind flank:	Deep and full.	Thin, cut up.
Underline:	Straight.	Sagged or bowed down.
Girth:	Large, practically equal at heart and hind flank.	At heart good, larger at hind flank.
Hind quarters:	Long and deep, heavily fleshed down to the hock.	Long, wide, deep, and devoid of sur plus flesh.
Hips:	Full, well covered.	Light, angular.
Thigh:	Broad, well filled.	Light and incurving.
Twist:	Full.	Open.
Tail:	Broad at tail head, well covered,	Prominent, though not coarse.
Escutcheon:	Well defined, broad, unbroken, wide at perineum, extending well over thighs.	
Udder:	Long, broad, extending well forward and well up behind, evenly quartered, not pendulous, folding glove-like when empty, fine and elastic, but not fleshy; hair, soft, plentiful, oily; teats, medium in size.	
Milk vein:	Large, tortuous, much-branched, entering the abdominal wall well forward on the belly through large orifices.	
Legs:	Medium to fine in bone.	
Skin:	Medium, elastic, covered with fine, soft hair.	Thinner than in the beef breed and with same characteristics.

Males of the dairy breed should be stronger in bone and not so rangy in body or limb, show evidence of constitution, and have easily traceable milk veins and embryo teats.

Nerve power is indicated by broad dished forehead, lively eye, and active ear.

The spinal column should be prominent and well developed.

Milk indications are shown by roomy, open-ribbed, capacious barrel, well developed udder and milk vein, spareness of form, and evidence of nerve power.

Quality of milk is shown by good handling qualities and rich yellow color inside of ear, over the udder, etc.

Constitution is indicated by absence of extreme refinement in head and neck, bright eye, well developed chest and spinal column, width at loin, and a marked pelvic arch.

A STUDY OF THE DETAILS OF CONFORMATION.

THE HEAD.

In studying the respective points of the beef and dairy animal as outlined it is best to commence with the head. There are two types of beef heads, as shown in figure 4, namely, Hereford and Shorthorn.

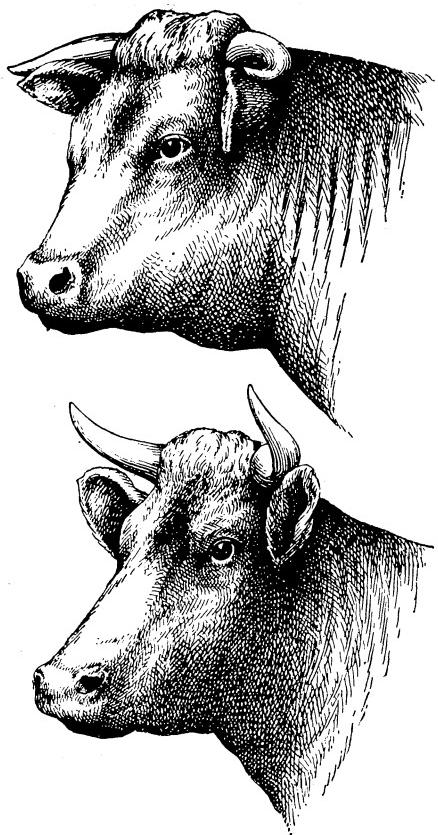


FIG. 4.—Typical heads of beef cattle.

The beef head should be short and compact, medium in size, refined in appearance, clean cut in contour, broad, with wide forehead, indicating a good supply of nervous force; the eye, large, clear, and limpid; the ear, fine, active, and covered with soft, silky hair; the mouth, large; the muzzle, medium in size, dewy, and free from coarseness; the jaw, medium heavy, well fleshed, with a good opening between the submaxillary space; the poll, rather broad and flat; and the horns medium-sized.

The eye is a very important factor in the make-up of any animal. It receives its nerve supply directly from the brain, and its clearness, brightness, and size indicate the degree of nervous energy and the disposition of the animal. An animal showing a large amount of white around the eye, or with a small pupil and a suppressed eye, is generally of a nervous, irritable temperament, and is

on this account a poor feeder. A broad and high forehead gives ample space for the housing of the brain, which, of course, directs and controls the nervous energy and influences digestion, assimilation, circulation, and other functions of the animal organization.

The nostril of the beef animal should be medium in size, with a clear bright lining membrane. If it is large, it indicates a predisposition to scrofulous diseases and the unnecessary oxidation and waste of food. If it is small, there is not sufficient room for the proper development of the air passages, and this is an indication of hereditary weakness. Under such circumstances sufficient air will not be

drawn into the lungs to complete the oxidation of the food, which must proceed rapidly in the case of animals consuming large quantities of "roughness."

As the chief function of cattle is to consume large quantities of food for the formation of flesh, fat, and milk, it is necessary that the mouth be large and the teeth be firmly set. A medium-sized horn, a refined ear, and an intelligent, active appearance, are all indications of considerable importance, as they are associated with good breeding, sufficient nerve energy, freedom from sluggishness, and gentleness of disposition—all points of great importance to the cattle feeder.

The head of a Jersey cow (fig. 5) presents the perfect type of bovine beauty. The Holstein cow is somewhat larger in the head, with a heavier face. In the illustration the Jersey head appears to be the broader. By actual measurement this is not generally the case; but the shorter head of the Jersey, with the greater dish to the face, causes this appearance. All that has been said regarding the mouth, nostrils, muzzle, eye, forehead, and the minor characteristics of the beef type is of equal importance in the case of the dairy animal. The development of the eye and brain should be especially emphasized.

Contours of the head of the dairy and beef types as seen from the front are shown in figure 6, *a* and *b*. The head of animal is slightly longer, with the poll a little more prominent, than in the case of the beef type. The face of the beef animal is coarser and heavier, the muzzle stronger, and the forehead is relatively longer and broader. The head of the dairy type presents a more sprightly appearance.

Figure 7 shows types of heads that are very objectionable. They are coarse; the face is long, heavy, and devoid of style, quality, or expression, and broad across the nostrils. The forehead is contracted, the poll flat, and the eyes depressed and lacking intelligence. This character of head indicates lack of breeding. Animals of this class rarely excel for beef or dairy production. They are represented in

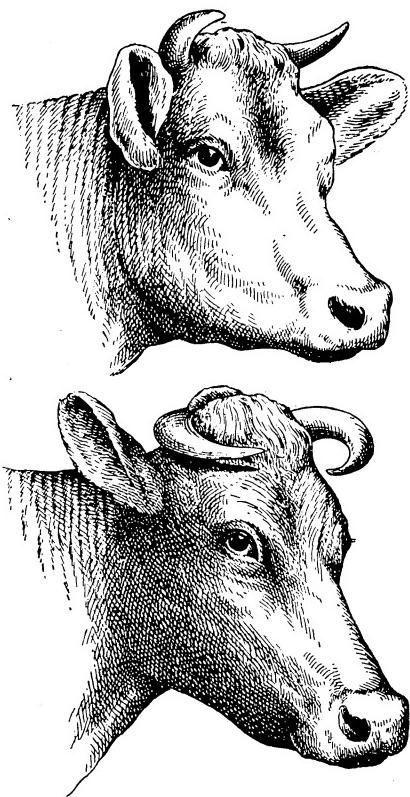


FIG. 5.—Typical heads of dairy cattle.

the scrub stock of the country before improvement has begun. Those who hope to feed cattle or enter the business of dairying should avoid

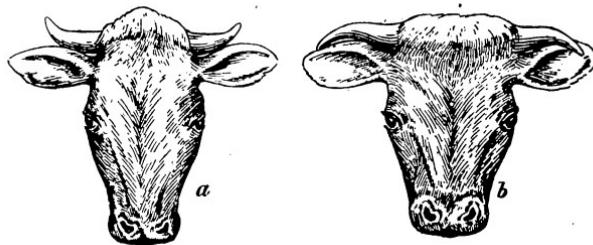


FIG. 6.—Relative development of frontal bone in dairy and beef cattle: *a*, dairy head; *b*, beef head.

such animals. They may form excellent foundation stock on which to grade up, but their defects are so apparent and so marked in actual



FIG. 7.—Heads of native steers deficient in quality.

practice that until they are graded up they should not be extensively used for the purposes indicated.



FIG. 8.—Frontal contours of heads: *a*, dairy head; *b*, beef head.

The relative contour of the frontal bone of the beef and dairy type is shown in figure 8. The eye of the dairy cow is particularly promi-

ment as compared with that of the beef animal. Another difference may be seen in the much greater dish in the face of the dairy type, not so much due to a curve of the nasal bone as to the greater prominence of the eye and to the clean-cut contour of the dairy type of head. The prominence of the eye in the dairy cow always makes the forehead seem somewhat depressed, whereas in the case of the beef animal (*b*) the line is comparatively straight. Notice that the beef head is thicker and heavier through the region of the face, cheek, and jaw, while the jaw and face of the dairy cow are longer and lighter, giving a greater refinement in general appearance.

THE NECK.

Figures 9 and 10 graphically exhibit some differences between the necks of good specimens of beef and dairy cattle. The superior neck line of the beef cow is almost straight, and the greater depth of the neck makes the inferior line lower than in the case of the dairy

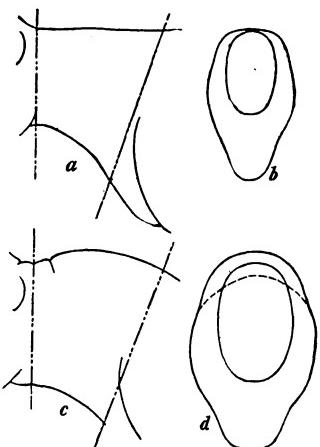


FIG. 9.—Necks of beef cattle: *a*, side view of cow's neck; *b*, front view of same; *c*, side view of bull's neck; *d*, front view of same.

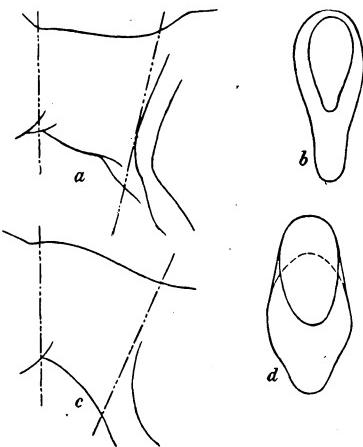


FIG. 10.—Necks of dairy cattle: *a*, side view of cow's neck; *b*, front view of same; *c*, side view of bull's neck; *d*, front view of same.

animal. The neck of the dairy animal is relatively longer and dished, or "ewe-necked," along the superior line. If the head of a typical specimen of each class were cut off at the forward and rear neck lines, the outlines shown at *b* (figs. 9 and 10) would result. The neck of the beef type is almost oval; that of the dairy flattened and oblong at its junction with the head.

In contrasting the neck development of beef and dairy sires results equally interesting are observed. The neck of the beef animal is relatively shorter, thicker, and more compact. Such would naturally be expected, for it has been observed that what may be termed a loose, rangy conformation indicates a tendency to use the food for

milk production, while compactness of conformation is associated with the use of food for flesh production. The neck of the beef sire is, of course, heavier than that of the dairy sire. The crest is also more marked, and the wrinkles on the top of the neck are more in evidence.

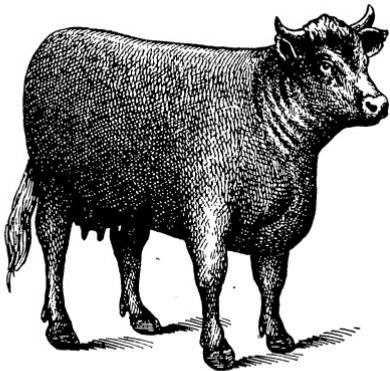


FIG. 11.—The beef cow's neck as seen from in front and below.

and has not the width, depth, or uniform heaviness of the beef sire's.

The principal defects of the neck in the case of either type are too long, too short, or too beefy. A long neck indicates constitutional weakness, especially if it is out of proportion to the other parts of the body. A lack of correlation of parts, such as this would indicate, is always associated with individual weakness. In the beef animal a long neck is more to be deplored than in the dairy animal, as ranginess is not compatible with excellence for beef production. A short neck in a dairy animal would indicate a tendency to beefiness. A heavy, beefy neck would be equally objectionable for dairy purposes as it indicates that the animal will use most of the food for the laying on of flesh, which is incompatible with a large milk flow. The male should be more compact in all respects than the cow for either milk or beef production. Ranginess should be sought in the cow. As the sire is really more than half the herd, defects introduced through him will be much harder to efface.

The character of neck sought in an animal intended for beef production is seen in figure 11. The neck, as indicated in figure 9, should be rounded and full at the junction with the head, and should gradually spread and fill out evenly, so that the junction with the shoulder will

evidence. The contour of the inferior line is relatively much straighter than in the case of the dairy sire. With regard to the perspective views shown at *d* (figs. 9 and 10), the neck of the beef sire is round and full and spreading to the junction of the neck vein, and carries its width and spring well down to the chest, blending insensibly into the shoulder. The dairy sire's neck is somewhat longer, oval, and flattened on the side, cut under and less massive at the throat,

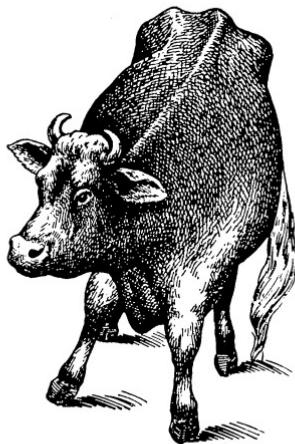


FIG. 12.—The dairy cow's neck as seen from above and in front.

be insensible, in marked contrast to the prominence of the desirable and characteristic shoulder of the dairy type.

The general appearance of the head and neck of a good type of dairy cow, as seen from the front while looking down, is brought out very nicely in figure 12. The thinness of the neck on top and the flatness on the side characteristic of the type are very well shown. The fineness of the neck where it blends with the head and the freedom from dewlap show breeding and quality. The sparseness of flesh desired in the dairy type and the flatness of the neck where it joins the shoulder make the neck vein very marked in this class of animals; so much so, in fact, that the shoulder seems to be abnormally prominent when compared with the beef type.

Figure 13 shows the neck of a dairy animal having several undesirable qualities. It is too low in the top line, too long, too thin, and lacks in depth. It would naturally belong to the kind of animal shown in this figure, namely, one light in the hind quarters, lacking depth

in the barrel, long in the leg, coarse in the head, and with a predisposition to various serofulous diseases, especially tuberculosis. This type of neck should be avoided.

GIRTHS.

Figure 14 shows the approximate girth at the heart, navel, and flank of beef and dairy animals. These girths show two well-defined wedges in the case of the dairy animal—one increasing in width from the withers downward, known as the heart girth, the other passing through the loin, being broad on top, with the apex in the region of the udder.

The girths of the beef animal, on the contrary, are characterized by greater smoothness and roundness in accord with the special propensities of the type.

A large girth at the navel is important, as it really measures the digestive, and hence the productive, capacity of either class. The navel, or umbilicus, of itself should evidence

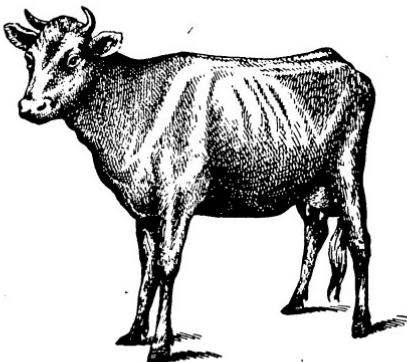


FIG. 13.—Side view of dairy cow's neck, deficient in development.

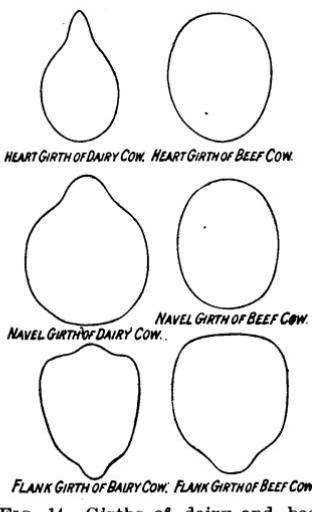


FIG. 14.—Girths of dairy and beef cows.

a strong foetal attachment, for the reason that its size in a measure indicates the degree of nourishment supplied the foetus *in utero*, and thus measures its native ability and strength of constitution. This point should never be overlooked, for it is safe to say that those who have never studied the question of maternity do not realize how seriously the ultimate development of the foetus may be affected through the interruption or temporary cessation of the flow of nutrient conveyed through the umbilicus. As a matter of observation, a strong umbilical attachment at birth is a pretty definite sign of a vigorous future growth.

THE BACK.

The comparative development sought in the back line of beef and dairy animals has been a subject of frequent discussion, and it is not unusual to find those who seek practically the same characteristics in both types. Careful investigation makes this position untenable,

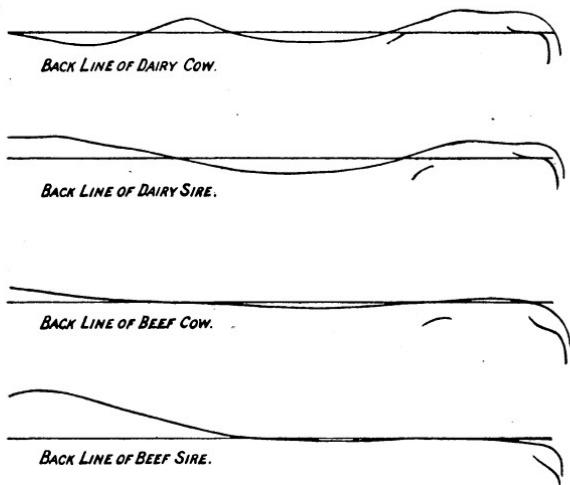


FIG. 15.—Back lines of dairy and beef animals.

and, in order to bring out the general conformation to be sought in the backs of these two types, figure 15 has been prepared. The back contours regarded as characteristic are compared with a straight line, to bring out the differences existing in the most emphatic manner. For example, in the back of the dairy cow the neck is depressed and ewe-shaped, the withers prominent, and the chine and middle piece slightly swayed. The hock points are on a line with the head, and the rump and pelvic region are considerably elevated. On the other hand, the back of the beef cow runs slightly above the line until the withers are reached, just a shade below at the chine and slightly above it at the pelvic region, being comparatively straight.

The back line of the dairy sire is crested and elevated considerably

above a straight line at the withers, while at the chine it is very considerably depressed, prominent, arched, and angular in the pelvic region, and drooping at the tail head. The back line of the beef sire, of course, is also crested. It should be straight at the chine and from

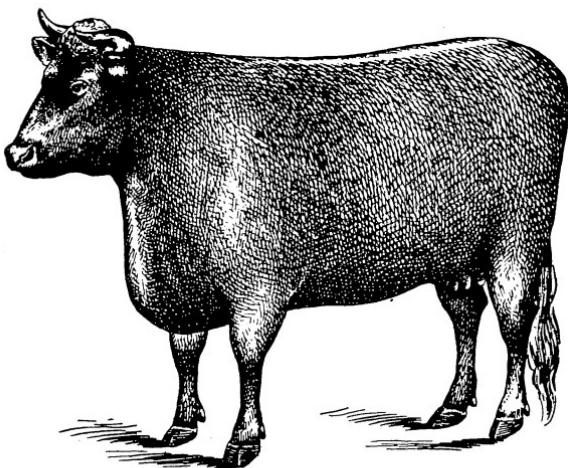


FIG. 16.—Beef cow showing proper development of back and side lines.

there to the setting on of the tail. The marked differences in this particular region should be given attention by the breeder, as they are well-defined features of the two types and have an important bearing on their adaptability for their respective spheres of service.

There is a marked difference in the degree of covering sought in the back of the beef and dairy types. That desired in the beef class is shown in figure 16. The back should be almost straight from the poll to the tail head, though slightly crested in front of the withers. It should be broad and level, and well covered with flesh which is soft and elastic to the touch. The backbone should be deeply covered at all points and should be well muscled in the region of the loin and pelvic arch. The well-sprung ribs and the fine covering of flesh are responsible for giving the back of the first-class beef animal that characteristic broadness, levelness, and beautiful rotundity.

The comparative appearance of the back of a dairy cow as seen from the side and above is shown in graphic detail in figure 17. Here the withers and vertebrae and the pelvic arch all stand out very



FIG. 17.—Back of dairy animal as it should be.

markedly owing to the sparseness of flesh. The ribs springing out on the side of the vertebræ add to the apparent prominence of the backbone. At the same time there is not the rotundity in the spring of the dairy cow's ribs found in the beef animal, and the barenness of the

covering, of course, makes the back seem narrower than it really is. Especially is this noticeable in the region of the withers and the loins. While the back of the dairy cow should have good handling qualities, in that the skin should be fine, soft and elastic, and the flesh firm, it is almost devoid of covering; but it should be remembered that the qualities shown by the type are due to the respective use and disposition made of the food rather than to the development of distinctive and abnormal features of conformation.

Figure 18 shows a rather coarse head accompanied by a narrow neck and back. A lateral view would show the neck to be too long and thin. When this type of neck and back are associated in a beef animal, it is generally safe to assume that he will be a poor and dainty feeder whose gain will be unsatisfactory.



FIG. 18.—A contracted back associated with flat ribs.

and back are associated in a beef animal, it is generally safe to assume that he will be a poor and dainty feeder whose gain will be unsatisfactory.

SIDE LINES.

It has been said that if a straightedge were brought in contact with the shoulder point and rump of a good specimen of the beef breed that it would touch at every point. While the statement may be slightly exaggerated, its general correctness is shown in figure 19, a study in side lines. The side line of the beef cow gradually bends in

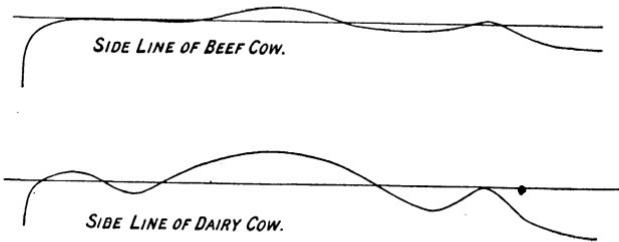


FIG. 19.—Side lines of beef and dairy cows.

from the shoulder to where the neck joins the head. There is a very slight depression at the crops, and a little bulging in the region of the paunch; from the flank across the hind quarter the contour line coincides with the straight line, while the rump makes almost a right angle with the same line. The side line of a dairy cow, on the other hand, varies considerably from a straight line. On account of the

thinness of the neck, the shoulder appears rather prominent. The sparseness through the region of the crops and the much greater relative development of the belly, the thinness of the flank, and the angularity of the thigh are responsible for the wide variations shown. Considering the sparseness desired in the type, however, these variations are not at all remarkable. Some surprise may be manifested at the greater development evidenced in the digestive organs of the dairy cow, but remembering her legitimate function of continually converting large quantities of coarse food into as refined and concentrated a product as milk this is not by any means an abnormal condition.

SHAPES: WEDGES AND PARALLELOGRAMS.

Figure 20 exhibits two horizontal cross sections through the dairy and beef types, one near the superior line, and the other lower down, passing through the region of the chest, vital and digestive organs. A word of explanation concerning the so-called wedges of the dairy cow may not be out of place. Owing to the spare and angular conformation desired in the milk cow, a few quite distinct wedges are apparent, namely: One increasing in width from the withers downward; one from the hocks and loin, decreasing in width downward; one through the body, shown in figure 20; and lastly, a wedge seen by taking a side view of the cow, showing an increasing width toward the posterior region. These wedges are favorable indications of dairy capacity, and their definition is therefore of considerable importance in judging. The wedge shape noted, however, does not arise so much from any material differences in conformation as compared with the beef type as to the lack of a heavy and uniform covering of flesh so finely evidenced by the beef type. As a result, the beef type shows no wedges but breadth, rotundity, and blockiness of outline, a striking divergence of form and quality as compared with the dairy cow.

Considering first the superior wedge (fig. 20), the beef animal shows but a slight contraction of the neck, carries great breadth and uniformity throughout its entire length, and is almost as square and broad at the withers as at the rear. The dairy cow's neck is very narrow, the withers relatively so, and there is a well-marked barrel depression in front of the hook points, while the hind quarters are rounding, flat, and narrow.

The inferior wedge of the beef animal has the same general outline as the superior, with the exception that it has a slightly greater

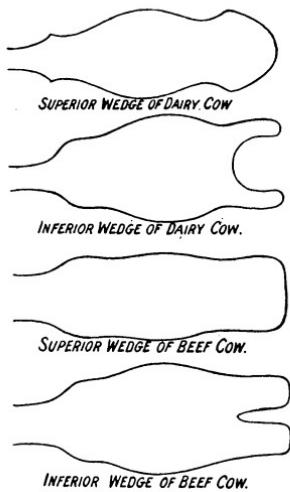


FIG. 20.—Contrasts in "wedges."

spread in the region of the belly, and the thighs are heavily fleshed, leaving but a limited space for the development of the udder. On the contrary, the dairy cow has plenty of breadth through the chest, giving abundant room for the proper housing of the vital organs, as the lungs, heart, etc. The belly has greater width proportionately than that of the beef cow, enabling the consumption and metabolism of the immense quantities of coarse food necessary to the production of milk. The greatest difference between the classes is observed in the hind quarters. The thigh is very thin from side to side, allowing a wide space between the hind legs, and permitting the development of a very large udder, necessary for the successful elaboration of milk. In other words, the dairy cow presents what is known as the "cat-ham" conformation in the hind quarter—that is, thinness and flatness from side to side of the thigh, accompanied by an incurving of the rear line so that the udder stands out prominently behind the thigh.

Figures 21 and 22 show outlines of the beef and dairy types as

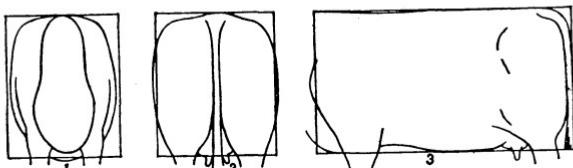


FIG. 21.—Outlines of shape of beef cow as compared with parallelograms.

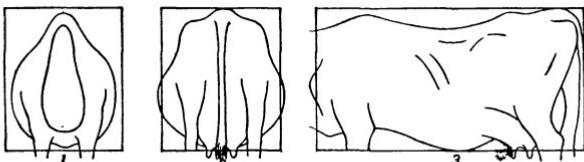


FIG. 22.—Outlines of shape of dairy cow as compared with parallelograms.

compared with parallelograms. Here anterior, posterior, and lateral views are shown. In a first-class type of beef animal the anterior wedge almost fills a rectangle, while the dairy wedge falls far short of this. When the posterior wedge is considered, the beef animal is shown to be almost square on top and to almost fill it completely, leaving but a little space unoccupied if the legs were cut off. The dairy animal is comparatively thin at the rump; the tail head is particularly angular at its setting on; the belly spreads slightly over the rectangle, while the thighs and hind quarters are considerably smaller.

Viewed from the side, the body of the beef animal, if the legs, head, and neck were cut off, would almost completely fill the parallelogram; while in the dairy animal the withers would hardly approach the top line, the back would be depressed, the thigh would be drawn in very materially in the rear, and the fore flank and breast would fall short

of the bottom line. The contrast is interesting and one that can be observed almost any day. It shows that there is a decided difference in conformation in animals of the two types, and emphasizes the facts that different methods of treatment must be pursued in order to secure animals of the best type; that they must be fed differently, as each has a specific purpose in production; and that they must be bred on different lines if advancement is to be secured.

THE RIBS.

There is considerable difference in the spring of the ribs of the beef and dairy animal (fig. 23), and the question may be raised why this should be. The ribs of the dairy animal seem to spring out from a lower line on the back than in the beef animal. It is not actually the case, but the apparent difference is due to the fact that the beef animal's ribs are generally so well covered with flesh that they seem to blend insensibly into the backbone. The dairy cow's ribs, however, do not spring out from the back with the rotundity shown in the beef class. They are more depressed and come out gradually, exhibiting a tremendous spread toward the lower extremity. They diverge more toward the posterior region, while the ribs of a beef animal have a clear, rounded spring and hang at right angles to the back. The posterior divergence of the ribs of the dairy cow is due to the fact that this animal has a relatively larger development of the digestive machinery than the beef animal. The highly cultured maternal instinct must also be kept in mind, for as a good dairy cow milks at least ten months of the year, she must carry and supply nutriment for a growing foetus for seven months of this period in addition to producing several times her own body weight of milk. The beef cow, on the other hand, produces but little milk while carrying the foetus, and never

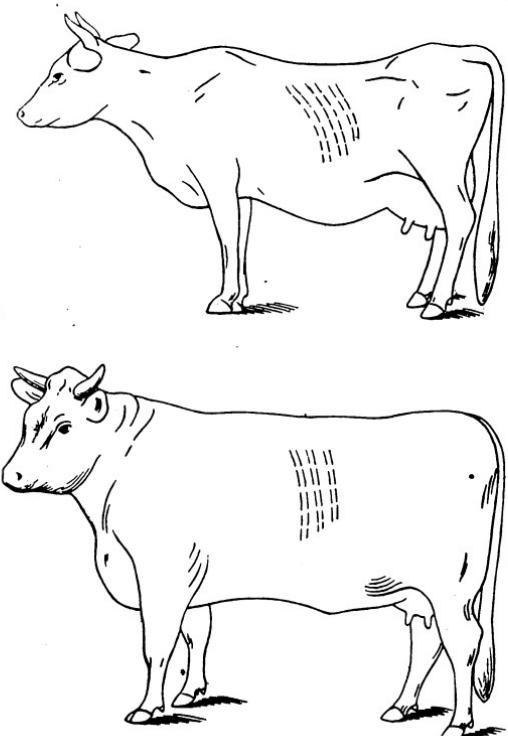


FIG. 23.—The spring of the ribs in dairy and beef cattle.

so much as the dairy cow, except in isolated cases; hence the strain on the back is never so great in her case. When the digestive and maternal organs, therefore, are fully worked, the tendency is to draw the ribs of the dairy cow forward on the ball and socket joint which

they make when uniting with the vertebræ of the backbone, and this has a tendency to lift up and support the back. Thus the strain on the back is lightened very materially, which is a wise provision of nature.

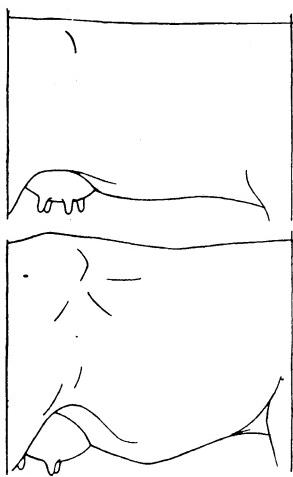


FIG. 24.—Development of barrel in beef and dairy cattle.

been formed from actual specimens without making allowance for the difference in size of the individuals. The greater size of the barrel in the dairy cow is of importance, as it enables that animal to consume and dispose of large quantities of coarse fodders satisfactorily.

THE HIND QUARTERS.

Figures 25, 26, 27, and 28 make possible a comparative study of the conformation sought in the hind quarters of beef and dairy animals. Figure 25 shows the proper formation of the hind quarters and barrel of the dairy cow. She should be cat-hammed and thin through the lower thigh. She should have a long quarter, and for the greatest utility and service be wide at the pin bones, and particularly so in the region of the loin and pelvis. The angles of the body should be evident and clearly defined, and there should be no sign of any surplus flesh, while the udder should be wide, deep, capacious, and strongly attached high up on the posterior side.

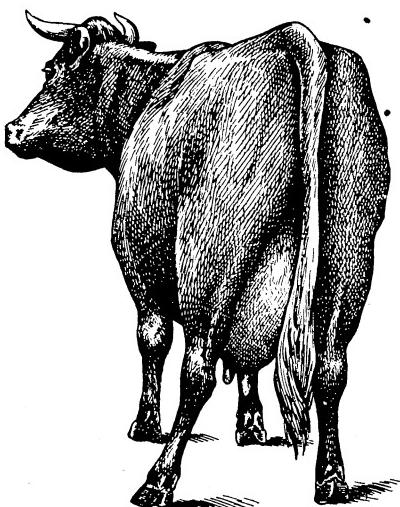


FIG. 25.—Dairy cow with proper development of posterior regions.

Figure 26 is a good example of what should be avoided in the dairy cow. The hind quarter is too contracted at the loin and pin bones—so much so, in fact, as to probably interfere with the normal functions of reproduction. While the thighs are thin, they are too closely set together to accommodate a large udder, and the udder has not sufficient depth or capacity to be satisfactory. While it is desirable to have prominence and angularity in the dairy cow, a lack of symmetry and correlation in parts is always associated with a weak and defective type of animal, lacking in character, in blood, and quality. The type is lacking in qualities stamped on the pure-bred by a long line of special selection and breeding. It is certainly inadvisable to use such a cow in the dairy. The description "spare and angular" does not mean a mass of skin and bones. An animal may be of the highest type and quality for the dairy and still have sufficient flesh and fat to make a healthy, comfortable appearing cow. The extreme skin-and-bone theory is a dangerous one and an actual impossibility where continued health, vigor, and freedom from disease are expected.



FIG. 26.—Dairy cow deficient in quality and symmetry.

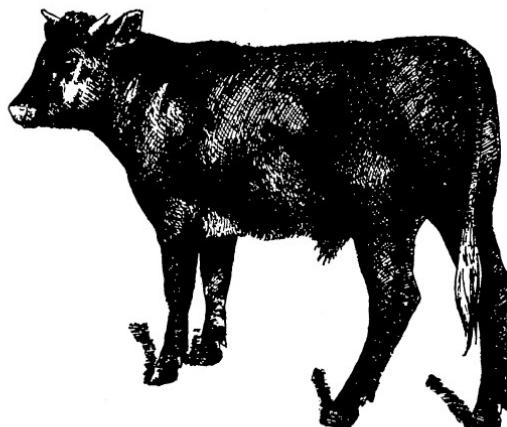


FIG. 27.—A young beef animal showing good development of posterior regions.

and a harmonious blending of the tail, head, and the pelvic arch. There should be width across the rump and thighs, and this width should be carried down to the hocks. The thigh on the outside should be rounding and full, broad, deep, and heavily fleshed. On the

Comparing these types with those shown in figures 27 and 28, a marked difference in the development of the hind quarter of the beef and dairy type is apparent. In figure 27 the qualities of a good beef animal are clearly expressed. There should be smoothness of outline both on the top and on the side. There should be breadth between the hook points and pin bones

inside the same characteristics should prevail. There should be comparatively little space between the legs down as low as the hock, and the fuller and deeper and more completely the space is filled, the better.

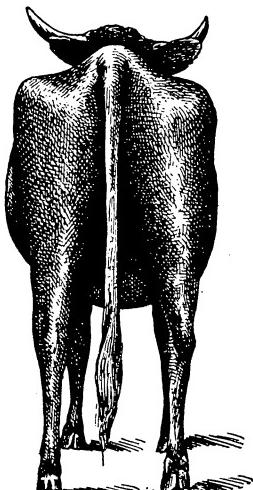


FIG. 28.—A native steer.

The kind of animal that should be avoided by the beef feeder is shown in figure 28. He is bony, angular, contracted at the rump and through the thigh, cut up in the thigh and twist, and incapable of making a satisfactory growth in the hind quarter. He is of the scrub class or Texas steer type, so often seen. It takes him four or five years to mature, and when he does, the greatest amount of flesh, such as it is, is generally found in the fore quarter. The hind quarter is poorly covered and the meat is of inferior quality, being coarse, stringy, and fibrous. This animal is an unprofitable feeder, though unfortunately the majority of our common stock shows many of his defects.

THE MILK VEINS.

Figure 29 shows three types of milk veins most commonly observed. At *a* may be seen a milk vein lacking in length and in tortuousness; at *b*, a milk vein of a much better type, and coming well forward on the belly; at *c*, a milk vein which is especially well developed and of a type found on many persistent milkers. The milk vein should come well forward on the belly, enter a large orifice, and disappear in the region of the heart. It should subdivide and branch out and be large and clearly defined. Reasoning from analogy and experience, the milk vein more or less measures the productive capacity of the udder for this reason: The blood is emptied into the udder by the pubic artery, and it is drawn from the udder by the pubic vein, which carries it back to the heart. As the milk is indirectly a product of the blood, the greater the circulation of the blood through the udder the greater must be the yield of milk resulting, other things being in accord. As the milk vein carries the blood from the udder back to the heart to be purified and again started on its round through the body, it seems that its large development is a matter of more than passing importance in the dairy animal,

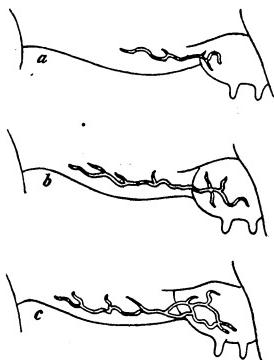


FIG. 29.—Types of milk veins.

THE UDDER.

Figure 30 shows the types of udder more or less desirable in the dairy cow. At *a* is shown as clearly as possible an ideal udder. The udder need not be over large. It should have sufficient capacity, however, to allow the continued growth of numerous cells for the manufacture of fat and its emulsification with the other constituents of milk. It should be evenly quartered, so that about the same amount of milk will be secured from each teat. It should be evenly balanced before and behind, and the central suture should be well developed and strongly attached to the body. It should be covered with soft, fine hair, be free from fleshiness, and closely attached to the body. It should come well forward on the belly, stand out well behind the thigh, and be carried well up on the posterior portion of the body. It should, of course, have good circumference, and if properly proportioned it will add beauty as well as utility to the cow.

At *b* (fig. 30) is shown the udder as it should collapse on itself, like a glove, after the milk has been extracted. A poorly balanced udder is shown at *c*; it is hung too far forward on the belly, and the teats are not evenly placed, resulting in a great inconvenience in milking. At *d* may be seen an udder deficient on its anterior face; at *e* an udder that is also lacking in balance, the teats are not evenly placed, and there is not sufficient development of the anterior region. At *f* is shown a small udder. There is not enough room here to permit of the rapid elaboration of milk, which is of prime importance, as it is a well-known fact that a comparatively small quantity of milk is in the udder when milking commences. It is likewise thought by scientists that the ability of a cow to produce milk abundantly is determined by the number of cells, and hence the area available for the distribution of blood and other fluids through the udder tissues is too restricted in this instance. A small udder is therefore a poor sign of deep-milking powers, though a large udder, owing to the character of tissues that may enter into its formation, is not always a sign of a good milker. At *g* is shown an udder much cut up, with very large and poorly placed teats; it is what may be termed a restricted udder, though rather elongated. At *h* appears another form of udder often met with, which, like that shown at *g*, is somewhat funnel-shaped in character;

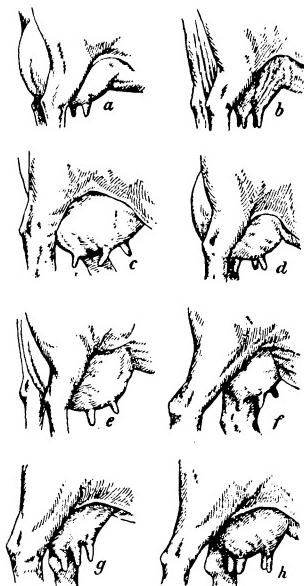


FIG. 30.—Types of udders.

it has not sufficient rotundity, does not come well forward on the belly, and is lacking in development in the posterior region.

Large udder development is not generally sought in the beef type, though one having the general qualities shown at *a* would be desirable for the beef cow, which must provide sufficient milk for the nutrition of her young.

The udder is a point that should be carefully considered in estimating the value of either the heifer or the cow. The udder probably transforms from the blood by its own action all the constituents of milk except the water. The teats are the natural outlets of the udder and are surrounded by sphincter muscles which, unless injured, prevent the loss of milk. Above the teat is situated the milk cistern, capable of holding about one-half to 1 pint of milk. Most of the milk is elaborated by the stimulus of milking, hence the great importance of doing this quickly, quietly, and regularly. Canals radiate out from the cistern into the udder tissues, finally ending in lobes resembling bunches of grapes, the final divisions being called lobules and alveoli, and corresponding to the individual grapes with the seeds distributed through the pulp. The alveoli are lined with cells, and these produce the fat and aid in the secretion of other ingredients of the milk. The number of alveoli thus measures the productive capacity of the cow, and as they may continue to form until the sixth year, everything should be done to assist in developing the udder. Especially is this important with heifers, because the milking habit, well established in them, becomes intensified as they get older. The value of milking young heifers and rubbing the udder before calving to induce a strong flow of blood toward this region is explained by this statement.

After all, milk is the product of the food consumed, aided by animal activities. The four stomachs of the ox soften and digest the food through the action of the saliva, gastric juice, bile, and pancreatic fluid. The nutritive portion can then be absorbed into the blood as it moves along the intestinal tract. The blood laden with food is driven into the heart, and from there to the lungs for purification, after which it passes into the arteries to nourish the body. In the cow a large portion passes down through the femoral artery and finally reaches the udder through the posterior abdominal or mammary artery. In the udder numberless ramifications occur, bringing the blood into contact with the alveoli, which rob it of its food, and thence it passes into the milk veins and so back to the heart. As digestion and circulation depend on nervous energy which centers in the brain, the interdependent relation of digestion, assimilation, circulation, and nerve energy in the production of milk becomes apparent, and the wonderful philosophy of the dairy cow's physiology can be better appreciated. To the rational mind it is certain, therefore,

that attention must be given these matters if success is attained in dairying. The importance of temperament in the dairy cow is thus clearly shown, for the nerves really control all the other normal functions of the body. The points indicating nerve energy should therefore receive the closest attention in judging the dairy type.

THE ESCUTCHEON.

Figure 31 outlines two types of escutcheon found in the dairy cow. Guenon, a French scientist, who thought that he had discovered an infallible method of estimating the merit of a dairy cow, made a most exhaustive study of this subject and published a treatise on his researches. As the artery supplying the udder with blood nourishes the skin of the escutcheon, there is some reason for believing it an index of the blood furnished the udder. The method has had, comparatively speaking, but a restricted utility, though strongly indorsed by some investigators. The escutcheon is made up of that part of the udder on the posterior region of the animal on which the hair is fine, soft, and silky, generally white in color, and running in the opposite direction from that on the other portions of the body. The change in the growth of the hair is supposed to be caused by the action of the artery. The escutcheon, "milk shield," or "milk mirror," as it was termed by Guenon, should extend well forward on the belly, be carried back over the region of the udder, spread out and cover the thighs where a line showing the hair running in the two directions indicated is most clearly seen; it should be white and bright and carried well up over the posterior region to the base of the perineum. Where the escutcheon is contracted or broken and does not spread out widely and uniformly on the thighs, it is not considered such a good indication as where it has the qualities enumerated. Breadth of the escutcheon over the posterior region is a sign associated with deep milking, and length and continuity with prolonged milking qualities; hence it should be carefully considered in estimating a dairy cow's value.

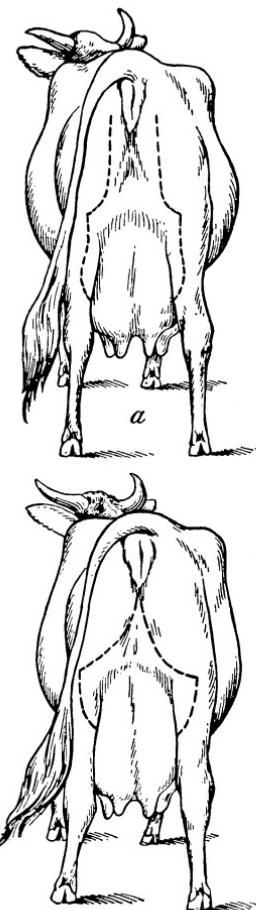


FIG. 31.—The escutcheon or "milk mirror."

SOME TYPICAL ANIMALS—GOOD, BAD, AND INDIFFERENT.

THE IDEAL DAIRY COW.

In figure 32 a dairy cow is presented whose general features are almost perfect. She has a medium-sized head and neck and a well-defined shoulder and neck vein. The body or barrel is medium to long, but with a great depth through the digestive region, and with a long, well-developed hind quarter and a nicely shaped udder. She is short-legged, close to the ground, angular, free from fleshiness. Her body shows symmetry, quality, correlation of parts, and therefore stamina and great digestive capacity, and she exhibits every indication of the power to give a large quantity of milk. It is rare that any person purchasing a cow having such apparent constitution, and conformation, and yet being a rangy open-jointed animal, will be disap-

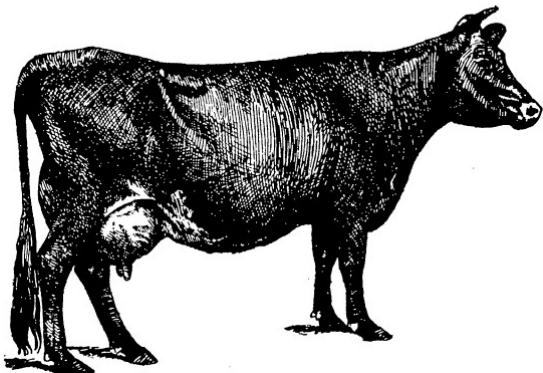


FIG. 32.—A typical dairy cow.

pointed in her as a money maker. There are exceptions to all rules, however, and no type can be described that will meet every contingency and pass every skirmish line unchallenged.

THE DUAL-PURPOSE COW.

Figure 33 presents a type of cow often found in dairies whose qualities tend strongly toward the beef order. She is what may be termed a dual-purpose cow. While this animal has undoubtedly a place on the farm, especially in the case of the farmer who is not interested in a specialty and whose location and general environments prevent him from being a specialist in dairying or beef making, cows of this class are not desirable for either milk or beef production exclusively, and can not be, as they have not the perfect qualities for either, and therefore can not possess the character sought for either in the highest degree. An animal of this kind, however, will produce a calf of superior value for beef production, while she herself will give a sufficient

quantity of milk to pay for her food and care and net a satisfactory sum besides. Such a cow has a special and unquestionable value for a large and increasing class of farmers.

One of the most serious mistakes made by the average farmer has been the indiscriminate crossing of beef and dairy types without any definite end in view. The results of this practice are too painfully evident in every stock center to make comment necessary. The financial losses already suffered as a result of this policy are appalling. But undoubtedly the worst thing attempted along this line is the effort to produce a dual-purpose cow by crossing a high-class beef or dairy sire on native cows. Nothing but loss and disappointment can follow such methods. The dual-purpose cow is both useful and valuable in her place. If she is desired, however, she must come

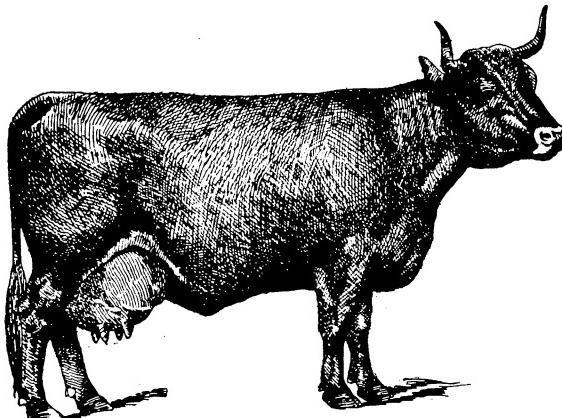


FIG. 33.—A dual-purpose cow.

from some of the well-established breeds of that type, and not from the absurd and purposeless crossing of beef and milk breeds.

DEFECTIVE DAIRY COWS.

In figure 34 a type of dairy cow is seen whose greatest defect is too much length of body and limbs. An especially long coupling is an evidence of weakness. The strain on the back not infrequently causes it to break down. The hindquarters and the body are not knit together strongly enough. An animal with a long neck and a slim body is a poor feeder, has a poor circulation of blood, as shown by the handling qualities, and is altogether a mediocre dairy animal. She should be avoided in dairying, as she can never be the most economical producer. Too many of our cows are of this "no man's type," and as a result the average annual production of butter per cow reaches only about 125 pounds.

In figure 35 a type of dairy cow is shown whose principal defect is a lack in depth through the digestive and pelvic regions, and whose

hind quarters are too short and generally contracted. Cows of this type are also commonly met with. They produce from 3,000 to 5,000 pounds of milk per year, though there are exceptions to the rule. This cow has many of the good points of the dairy animal, being clean-cut in contour, free from fleshiness, and, but for the defects mentioned, would be an excellent cow. As it is, she may be rated from second to third class for dairy purposes.

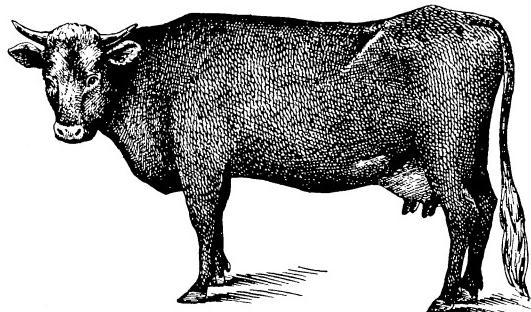


FIG. 34.—A dairy cow too long in the coupling.

In breeding to get the best style of cow for dairy farming with sufficient strength of constitution and stamina to last through a number of years, careful attention should be given to the selection of the dam, as well as the sire. The mother selected should be deep through

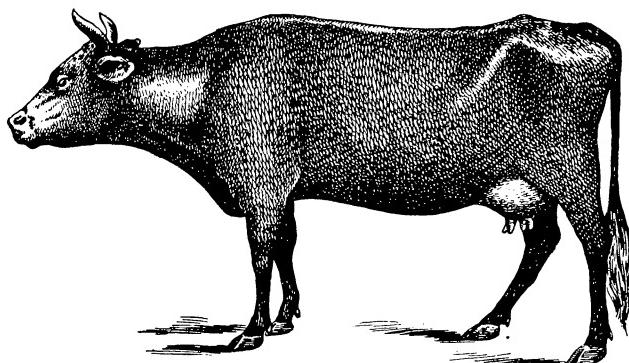


FIG. 35.—A fairly good dairy animal, but lacking in depth and stamina.

as measured from the top to the bottom lines, and especially so through the withers, chine, and in the pelvic region. If more attention were given to the selection of vigorous breeding cows of the proper type, better results would be obtained in farm practice. The type of cow shown in figure 35 does not possess sufficient stamina for a long period of highly remunerative dairy service, nor is she as a rule a persistent milker.

THE SCRUB COW.

In figure 36 a good illustration of the old familiar scrub cow is found. She has no special utility for any purpose when regarded from the standpoint of the specialist, and she has a very restricted sphere of usefulness from the standpoint of economy. Unfortunately, she is the cow most commonly met with in all the Southern country, and this accounts for the unsatisfactory status of the dairy business in a region thrice blessed by nature for its unlimited and profitable development. Why she should occupy such a large place in the farmers' affections is hard to understand, but most likely he has never thought enough about cows to know why. If this bulletin will only start the

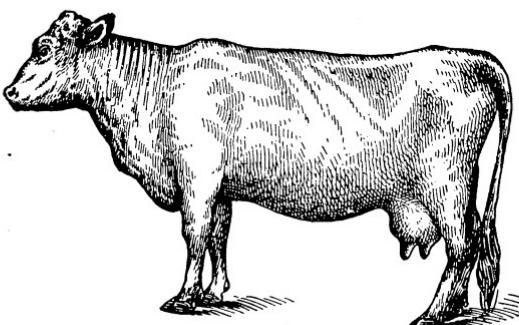


FIG. 36.—A scrub cow.

Southern farmer to thinking on the subject it will have accomplished the highest end it could possibly serve, for that means the rapid effacement of the scrub cow, with her epoch of poverty and distrust in the profits of stock husbandry. The order she represents is long in the leg and body, has a very undesirable style of udder, and a heavy head. She has some of the defects of all the types and but few of the desirable qualities of any. She does more to retard the growth of animal industry and the economical production of beef and milk than all other influences in our country. Her reproduction is a thing to be strenuously avoided. She produces from 1,000 to 3,000 pounds of milk a year, makes a very inferior quality of meat when subjected to the slaughter test, and her offspring, inheriting her defects, does not perpetuate any of the qualities that must be sought where economical production is hoped for.

THE POLLED TYPE OF BEEF CATTLE.

Figures 37 and 38 present two views of one of the polled types, the Aberdeen Angus, an animal admirably adapted for beef making. A beautiful symmetry and correlation of parts is evidenced here. The general rotundity and the parallelogramic form desirable in the beef animal are highly developed. Refinement is shown in the head and

every feature of the organization, and that there is a minimum of offal is clearly evident. The straightness of the back line, the uniform depth of the body, the squareness, length and depth of the hind quarter, and the breadth and depth of the chest all show a well-fleshed

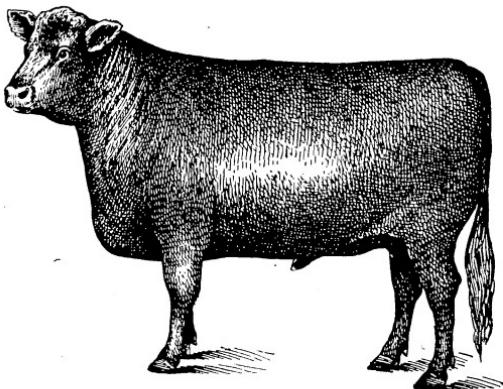


FIG. 37.—A first-class beef steer.

animal, one which will produce cheap beef of high quality, and will also possess early maturing qualities. This is the ideal our feeders

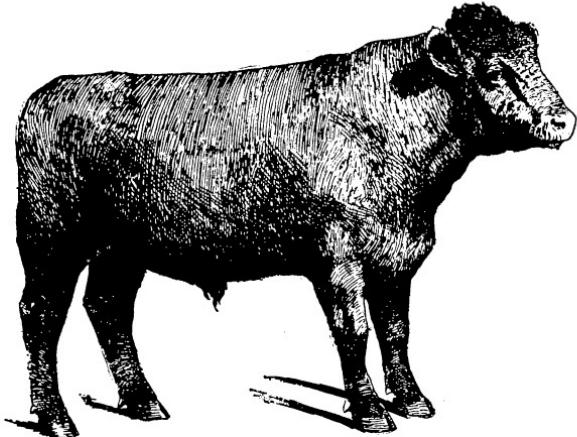


FIG. 38.—A uniformly developed feeder.

and breeders should keep before them if they hope to produce beef of the right class and beef that can be made at paying prices.

THE RANGE STEER.

Contrast with the foregoing the animal shown in figure 39. Here we have a type of range steer now fast disappearing, and commonly known as the Texas steer. It is apparent that defects chiefly predominate in the make-up of this animal. The head is coarse and

heavy, there is much dewlap, the neck is flat on the side, instead of being round, full, and even. The shoulders are prominent, the legs heavy, the bones exceedingly coarse, and the fore quarter almost abnormally developed, though not in the direction of quality and refinement. The ribs are flat, the backbone is prominent, and the body is poorly covered with flesh. The hind quarter is short, the thigh thin and lacking in fullness, the flank light and cut up, and the angles of the body too prominent to suit even a dairy specialist.

As a class these animals do not mature until four or five years of age, and the percentage of dressed meat to the live weight is only about 50, whereas in the improved types it is 60 to 65 and they are ready for the market at about two or two and one-half years. The folly of attempting to engage in beef production with such a class of animals, especially if stall feeding and intensive farming are practiced, must be apparent to all. The type can be improved remarkably soon and in a most effective manner, and for the sake of economy and in the name of common sense the matter should be given attention by our farmers at the earliest possible date.

A POOR FEEDER.

Figure 40 represents a class of beef animal often met with in the South whose characteristics show him to be a poor feeder. While he will mature earlier and make a better quality of beef

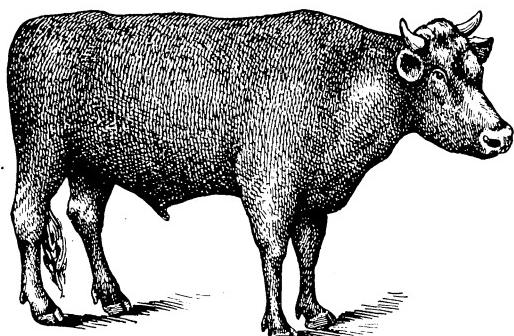


FIG. 40.—A poorly developed feeder.

than the Texas steer, he is a slow, irregular, and expensive feeder, and one that will not mature with the rapidity of the animal shown in figure 39. He is to be avoided where profit from growing and feeding beef cattle is the object sought.

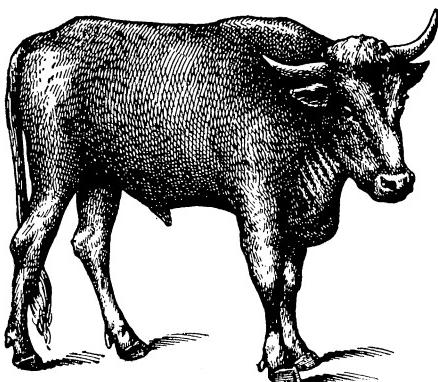


FIG. 39.—An unprofitable feeder.

GRADING UP COMMON STOCK BY CROSSING.

Attention having been called to some of the defective types of beef and dairy animals, the question of how to improve our native stock of animals cheaply and effectively so that the great mass of people may participate in the benefits to be derived may now be considered. The cheapest and most successful way is by crossing dairy and beef sires of proper quality on our native stocks. The first cross usually exhibits a great improvement over the original type, and two or three crosses produce results that may be considered most satisfactory.

A GOOD DAIRY SIRE.

In figure 41 is shown a splendid type of dairy sire. He has all the qualities that we have tried to describe as adjuncts to dairy production. He has the crested neck, refined head, clean-cut features, depressed back, cat hams, and smoothness and symmetry of outline that are always accompaniments of blood and breeding. Used on our

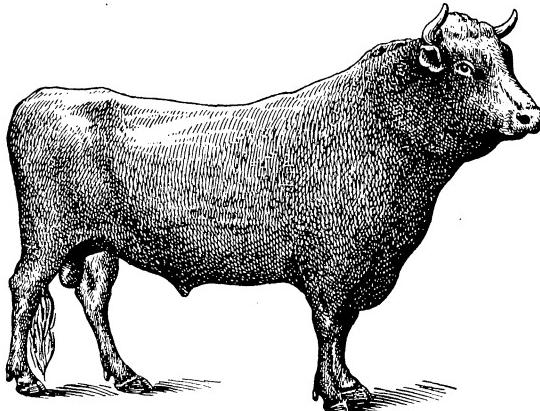


FIG. 41—A typical dairy sire.

native stocks, he will produce remarkable results in a short time. As the sire is more than half the herd, this makes it possible for hundreds of our farmers, who are now suffering from having too many poor animals on hand, to effect improvement at a small cost. If one man is not able to purchase a desirable sire, several can club together and a whole community be benefited in this way.

SOME GOOD DAIRY HEIFERS.

Figure 42 shows types of young stock to be sought for dairy production. These animals are rather long in the barrel and neck, with medium-sized heads, broad foreheads, and well-developed hind quarters, though with a lightness in this region not desirable if beef were the object sought. The conformation indicates the development of large digestive organs, a point of vital importance, as it determines

their ultimate worth for dairy purposes, for on digestion depends circulation, on circulation depends resorption, and on resorption depends

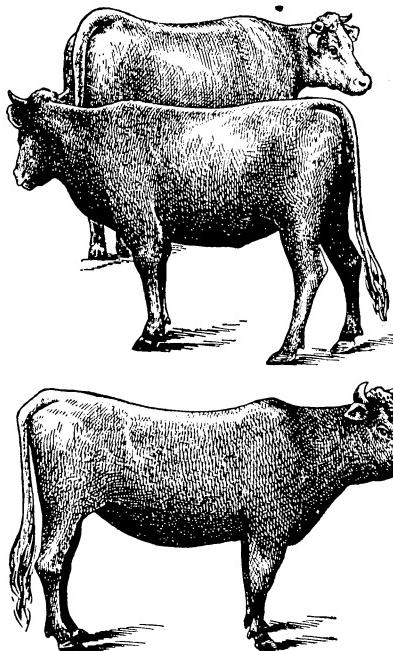


FIG. 42.—Dairy heifers from native cows crossed with a dairy sire.

the food supply of the blood, and hence the amount of food that can be manufactured into milk and butter.

A GOOD BEEF SIRE.

A beef sire of good form and with excellent proportions is shown in figure 43. The broad, high forehead, short head, and clean contour

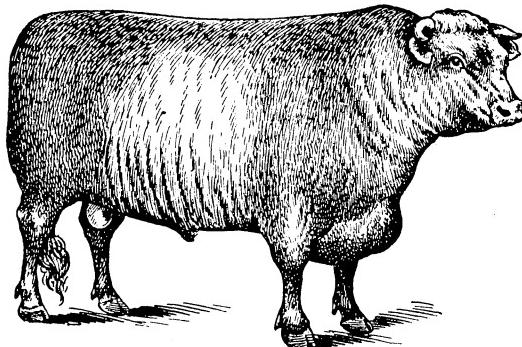


FIG. 43.—A typical beef sire.

lines of the head and face evidence quality and blood. The crested and nicely rounded neck harmonizes and blends admirably with the

splendid development of breast and brisket. The top and under lines are almost straight and parallel with each other, combined with depth, breadth, and fullness of the hind quarter, and smoothness and refinement in every feature of the make-up. He is a well-fleshed animal, with superb handling qualities, supplied with an ample reserve of energy, and altogether a superior and attractive type of sire, who will beget the qualities of the economical feeder in his offspring.

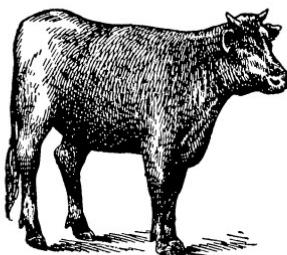
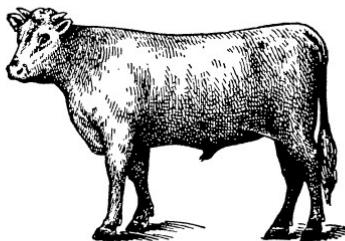


FIG. 44.—Young beef animals from native cows crossed with a pure-bred sire.

connection with our stock industries? The dollars and cents in the business lie behind the present wall of ignorance and apathy, but they are surely there and will be gathered in by the man who breeds and feeds stock after a modern and rational system.

YOUNG BEEF ANIMALS.

Some excellent specimens of young animals for beef making, as seen from different viewpoints, are shown in figure 44. The head is moderately fine, the back straight, the quarter long, deep, and well developed, and the outline smooth and symmetrical. The desirable qualities result from the use of the improved sire on our native stock. They are of a type that is profitable to the breeder and the feeder, and suitable for export. When we consider how readily improvement can be effected on the native stocks of the country through the medium of the pure-bred sire, it is a mystery hard to explain why so little advancement should be witnessed at the present time.

Are we not on the threshold of better things, a more intelligent system of breeding, more thinking in

